

**What is claimed is:**

**[Claim 1]** A degradation resistant composition of matter for use in living tissue comprising, comprising: an yttria-stabilized tetragonal zirconia polycrystal substrate; a coating of alumina deposited on the substrate, said coating being deposited by ion beam assisted deposition in the presence of the substrate; and wherein said coating has a total porosity of less than about 1.0 percent.

**[Claim 2]** The material of claim 1, wherein said coating has an average grain size less than about 0.5 microns.

**[Claim 3]** The material of claim 1, wherein said coating comprises alpha-alumina, amorphous alumina, or a blend thereof.

**[Claim 4]** The material of claim 1, wherein said coating has a thickness that is greater than about 1.6 micron and less than about 10 microns.

**[Claim 5]** The material of claim 1, wherein said yttria-stabilized tetragonal zirconia polycrystal substrate comprises about 3 mole percent yttria.

**[Claim 6]** A method of manufacturing a degradation resistant component for use in living tissue, comprising the steps of:

providing a component comprised of yttria-stabilized tetragonal zirconia polycrystal ceramic;

depositing a coating of alumina by ion beam assisted deposition on the component; and

selecting deposition parameters to achieve a coating comprised of less than about 1.0 percent total porosity.

[Claim 7] The method according to claim 6, wherein said depositing a coating comprises the step of depositing alpha-alumina, amorphous alumina, or a blend thereof.

[Claim 8] The method according to claim 6, wherein said depositing a coating comprises the step of depositing a coating comprised of an average grain size less than about 0.5 microns.

[Claim 9] The method according to claim 6, wherein said depositing a coating of alumina comprises depositing a coating comprising a thickness that is greater than about 1.6 micron and less than about 10 microns.

[Claim 10] The method according to claim 6, wherein said providing a component comprises providing a component comprising about 3 mole percent yttria.

[Claim 11] The method according to claim 6, wherein said selecting deposition parameters comprises selecting an ion beam bombardment energy of about 1000 eV and an ion beam current of about 26 mA.

[Claim 12] The method according to claim 6, wherein said depositing a coating comprises depositing at a rate of about 1.5 angstroms per second.